

> Step 1

a) Given data:

Average seek time = 11ms

Disk transfer rate = 34MB/Sec

Controller transfer rate = 480MB/Sec

Average time = ?

> Step 2

$$\begin{aligned}\text{Average rotational delay} &= \frac{0.5 \text{ rotation}}{7200 \text{ RPM}} \\ &= \frac{0.5 \text{ rotation}}{7200 \text{ RPM}/60} \\ &= 4.16 \text{ms}\end{aligned}$$

> Step 3

Average time = Average seek time + average rotational delay + transfer time + controller overhead

$$\begin{aligned}\text{Average time} &= 11\text{ms} + \frac{0.5}{7200/60} + \frac{1024}{34 \times 2^{20}} + \frac{1024}{480 \times 2^{20}/8} \\ &= 11 + 4.16 + 2.87 \times 10^{-5} + 1.62 \times 10^{-5} \\ &= 15.160\text{ms}\end{aligned}$$

$$\therefore \text{Average time} = 15.160\text{ms}$$

> Step 4

b) b) Given data:

Average seek time = 9ms

Disk transfer rate = 34MB/Sec

Controller transfer rate = 480MB/Sec

Average time = ?

> Step 5

$$\begin{aligned}\text{Average time} &= 9\text{ms} + \frac{0.5}{7200/60} + \frac{1024}{30 \times 2^{20}} + \frac{1024}{500 \times 2^{20}/8} \\ &= 9 + 4.16 \times 10^{-3} + 3.25 \times 10^{-5} + 1.56 \times 10^{-5} \\ &= 13.2\text{ms}\end{aligned}$$

\therefore Average time = 13.2ms

> Step 1

The seek time is a dominant factor for all disk I/O time. Although RPM would make a significant contribution as well by doubling the block size, the RW time changes very little. Thus, block size does not seem to be critical.